

**Removal Mount**

The invention relates to a retaining device for containers and to a container arrangement.

In the case of various treatment procedures, it is necessary for different materials to be used in a certain sequence. In particular if only small amounts of these materials are used, the materials are usually provided in correspondingly dimensioned containers. For production reasons, it is usually the case that identical containers are used for the various materials, with the result that, despite the presence of distinguishing features, e.g. texts, markings, numbering, color coding, etc., the user may get the containers mixed up. If there is a deviation from the predetermined sequence, it is possible for the desired result not to be achieved or, in the worst-case scenario, even for damage to occur. Such treatment procedures are possible in various sectors, for example for medical and dental applications, in the cosmetics sector, and in the case of technical materials such as (coating-)repair sets in the automotive sector, or adhesives. During these treatment procedures, a series of substances has to be applied or introduced in a certain sequence to the area which is to be treated. The respective substances are usually provided in single-dose containers, in some cases with a suitable applicator. A suitable container for, for example, the dental sector is described, for example, in EP 0 901 452. The substance or the substance components is/are located in chambers which are to be opened immediately before use, for example by the application instrument, and the substances may possibly be mixed. In the event of an accidental deviation from the predetermined sequence, this may have grave consequences for the use result. If the incorrect sequence is noticed during application, this means that, for example a new

set of treatment means has to be used, or even that additional treatment steps are necessary in order to prevent further-reaching damage.

The object of the present invention is to avoid the disadvantages of the prior art, in particular to provide a retaining device and a container arrangement which prevents the sequence from getting confused during removal of the containers.

The object is achieved by a retaining device and a container arrangement according to the characterizing features of the independent claims.

The retaining device for at least two containers, comprising a basic body, is distinguished by an accommodating opening, in which the containers can be fixed in a defined removal sequence.

The containers, which are held ready in the retaining device, are preferably small-quantity containers. It is further preferred for these containers to be single-dose or single-portion containers, for example for restorative dental materials, coating-repair sets or adhesives. These containers, furthermore, may contain applicators.

The basic body may have various geometrical shapes. For example, in a first embodiment, the basic body is designed as a flat body, i.e. one of the three dimensions has a short length extent compared to the others, for example a rectangular plate or a flat oval. In a second embodiment, the basic body is configured as a tubular body, of which the circumferential wall is breached or missing in parts. One or both of the end surfaces of this tubular body may preferably be closed.

An accommodating opening is to be understood as meaning an opening in the basic body which allows the containers to be introduced into, and removed from, the retaining device in an ordered manner. Furthermore, it is possible, in principle, for the accommodating opening to have different geometrical shapes. The accommodating opening may be of linear or curved-conical or u-shaped design in the outer region, i.e. in the peripheral region of the basic body. In this case, the opening in the outer region of the basic body advantageously has at least a width which corresponds to the diameter of the container region which is retained in the retaining device. On account of the accommodating opening tapering in the direction of the centre of the basic body, the container can be removed relatively easily from the retaining device since a lesser amount of force has to be applied the further the container is removed from the accommodating opening in the direction of the outer periphery. The accommodating opening extends from the peripheral border, i.e. outer region of the basic body into the center of the basic body. The length of the accommodating opening may be defined in dependence on the number of containers which are to be accommodated and with account being taken of the stability of the basic body. It is also possible for the course taken by the accommodating opening in the basic body to be selected by the person skilled in the art depending on requirements. For example, a sinusoidal course of the accommodating opening results in a relatively large surface area for information or instructions being available on the basic body in the immediate vicinity of the container. It is possible for the accommodating opening, in the interior of the basic body, to be in the form of a gap or slot which, in the case of a basic body of, for example, planar design, extends over the entire thickness. It is possible for the profile of this slot or gap to be both uniform (e.g. parallel edges) and variable (e.g. concave or convex, conical) over the

entire thickness of the basic body. In one embodiment, it is possible for the accommodating opening, in the interior of the basic body, preferably to be configured to be narrower than the diameter of the container region which is arranged in the accommodating opening. Such a configuration makes it possible, in a further advantageous manner, to avoid premature opening of the container. Other possible ways of configuring the accommodating opening which can likewise prevent premature opening of the container prior to removal from the retaining device are familiar to the person skilled in the art. Activation or access to the contents is thus only possible when the containers are removed from the retaining device. Activation may be brought about by various measures known to the person skilled in the art. A risk of premature opening arises, in particular, in the case of two-part containers, in which, for example, the chamber part for mixing the substance with the applicator has a smaller diameter than the substance chamber (storage chamber) and in which, for the purpose of releasing the substance, this mixing-chamber part is forced into the substance chamber. Mixing is not always necessary; it is also possible to have a liquid which can be applied, or is accessible, as a result of activation. As an alternative, it is also possible for the storage chamber to be closed by a sealing foil or plastic sheet and to be activated, i.e. rendered accessible, by means of a pin or the like. However, since the accommodating opening has a width which is more or less identical to, or even smaller than, the mixing-chamber part, the container cannot be compressed in the retaining device according to the invention. The person skilled in the art is aware of various further shapes for these containers and will adapt the retaining device according to the invention, i.e. the shape of the accommodating openings and/or of the basic body with the mounts, to this container shape. Accidental opening of

the mixing-chamber part is thus ruled out. The retaining device therefore simultaneously performs a double function.

According to the second embodiment, however, it is also possible for the accommodating opening to be designed such that it is closed by a tamperproof closure prior to the removal of the containers and is opened in an irreversible manner by the removal of the first container. In this form, the containers, in the first instance, are introduced into the retaining device through a further opening in the basic body, and this further opening is then closed. Such an embodiment is particularly suitable for containers which have small, compact applicators or none at all.

The retaining device for at least two containers is further advantageously distinguished by a mount for at least a first and a second container, the accommodating opening being designed such that the first container can only be removed from the accommodating opening if the second container has already been removed.

According to the first embodiment, these mounts advantageously have a larger width or diameter than the accommodating opening itself. The width or the diameter, however, is smaller than the largest diameter of the container which is to be retained. This mount allows the container to be fixed to better effect in spatial terms in the accommodating opening and thus in the retaining device. At the same time, excessive deformation of the container is avoided, with the result that the container can be opened without any adverse effects and in a manner appropriate for usage. The fact that the mount has a larger width or diameter than the accommodating opening also facilitates the removal of the container, in particular since the initial resistance which has to be overcome for removal purposes is relatively

small. The mount may be adapted to the shape of the container, for example it may be of circular or oval configuration.

In a second embodiment, the mounts are configured as tubular portions of the basic body. Furthermore, the basic body has elements such as latching noses which fix the containers within the longitudinal axis of the basic body.

The basic body is preferably produced from a polymer material with elastic properties, with the result that the accommodating opening can be widened elastically for removal of a container. Examples of suitable polymer materials of this type are polyethylene, polypropylene and the copolymers thereof, copolymers of aliphatic and cyclic hydrocarbons, polystyrene and the copolymers thereof, polyamide, PET, PBT, polyetherketones or polycarbonates. It is additionally possible for the properties of these materials to be set to certain requirements, with the result that the retaining device according to the invention can easily be produced using these materials.

In a further preferred first embodiment, the retaining device has at least one grip surface, and preferably two grip surfaces. The grip surfaces allow the retaining device to be held securely and straightforwardly in one hand, while the container is removed from the retaining device by the other hand. The grip surfaces preferably have an ergonomic shape or have elements for improving the grip, e.g. linear or latticework elevations. It is likewise advantageous for the grip surfaces to be arranged on that side of the basic body which is located opposite the accommodating opening. When the retaining device is held, the accommodating opening, rather than being compressed, is widened and facilitates removal. As an alternative to the grip surfaces, the retaining device may have a fastening opening or plug-on open-

ing, by means of which the retaining device can be fitted onto one or more of the user's fingers. By virtue of such a plug-on opening, the retaining device remains in the immediate vicinity of the user, who nevertheless has both hands free for the treatments which are to be carried out. The plug-on opening here may be provided as an annular opening or as an open, annular portion on the basic body. The person skilled in the art is aware of, or can conceive of, various different forms of such plug-on openings.

In a modification of the first embodiment of the retaining device, the accommodating opening has such a profiling that it is possible to retain, for example, containers which do not have any narrowing or constriction in the container body. The accommodating opening here has two or more widths, although the largest width is considerably smaller than the diameter of the container region which is retained by the basic body. For example, the profile of the accommodating opening may be designed in the manner of a T lying on the short legs. Other suitable profile structures are likewise conceivable. The container is thus retained by the profile portion corresponding to the crossbar of the lying T shape.

The retaining device is designed in a further advantageous manner if the basic body has at least one standing surface. By means of a standing surface, the retaining device can be set down on an underlying surface such that it can easily be picked up again for removal of a further container. It is possible here for the standing surface to be integrated directly in the basic body or to be integrally formed on the basic body as an additional element. The standing surface is formed, for example, by three or four protrusions projecting on the basic body. It is advantageously possible, at the same time, for grip surfaces to

be integrated in two of these protrusions. It is also conceivable for the basic body to have just two protrusions arranged in the region of the accommodating opening. The third "standing foot" which is necessary for the retaining device to stand in a stable manner may be formed by a container. As a further possibility, the basic body may have a standing surface which corresponds to one leg of a U lying on its side. The accommodating opening which is necessary for accommodating the containers is located in the other leg. Further configurations are known to the person skilled in the art.

In a further embodiment, the retaining device has at least one additional means for accommodating containers which have already been used, i.e. activated. These accommodating means advantageously allow the user to set down the used containers easily and clearly. The containers may be disposed of together with the retaining device. It is possible for the accommodating means to be contained directly in the retaining device or to have been joined to the latter subsequently. The accommodating means is preferably produced integrally with the basic body.

A further aspect of the invention concerns a container arrangement having at least two containers and a retaining device according to the invention for accommodating and connecting the containers, the container arrangement being distinguished by such an arrangement of the containers in the retaining device that the containers can be removed from the retaining device in a predeterminable sequence.

The container arrangement is further characterized in that the retaining device and the containers are designed such that the retaining device accommodates the containers in a form-fitting



manner. This avoids the situation where the containers accidentally fall out of the retaining device.

The container arrangement for accommodating at least two containers using a retaining device according to the invention likewise forms an aspect of the invention.

Possible examples of material combinations for sequential use are as follows: primer and bonding agent, primer and adhesive, prime coat and top coat, color coat and clear coat, primer and adhesive, adhesive and effect pigments, etc. Combinations of pharmaceutical preparations or other therapeutic substances are also conceivable.

The retaining device and container arrangement according to the invention will be explained in more detail with reference to the sketched figures and examples.

In the figures:

- Figure 1a: shows a plan view of a retaining device;
- Figure 1b: shows a container which can be inserted into the retaining device;
- Figure 2: shows a retaining device with containers inserted;
- Figure 3: shows a plan view of a further retaining device;
- Figure 4: shows a further first embodiment of a retaining device;
- Figure 5: shows a side view of a further first embodiment of a retaining device;
- Figure 6a: shows a retaining device with a profiled breach;
- Figure 6b: shows a side view of this retaining device;
- Figure 7a: shows a second embodiment of a retaining device;

Figure 7b: shows a second embodiment with containers;  
Figure 8a: shows the plan view of a third embodiment;  
Figure 8b: shows a side view of this embodiment;  
Figure 8c: shows an alternative third embodiment;  
Figure 9a: shows a modified retaining device with profiled breach in cross section;  
Figures 9b and c: show the use of this modified retaining device; and  
Figure 10: shows a retaining device with fastening openings for accommodating the used containers.

The figures are not true to scale and show essentially the fundamental elements of the retaining devices according to the invention.

The retaining device 1 in Figure 1a shows the essential elements for accommodating containers 5. A possible container is illustrated by way of example in Figure 1b. The basic body 11 of the retaining device 1 has a rectangular shape with an accommodating opening 2. The basic body 11 consists of polyethylene and has a thickness of 6 mm. This accommodating opening 2 tapers in cross section from the outer edge to the center of the basic body and is provided, in turn, with two mounts 4. The accommodating opening has a width of 4 mm in the center of the basic body 11. In the mounts 4, the containers which are to be introduced are fixed in the accommodating opening 2 such that the handling for removing the containers is also simplified.

The container 5 in Figure 1b essentially comprises three parts and corresponds to a container from Dentaco. The applicator 6 is stored in the mixing chamber 7 and only comes into contact with the reagent in chamber 8 when the mixing chamber 7 has breached the closed opening, provided with predetermined breaking points,

of the chamber 8. On account of this procedure, the mixing chamber 7 has a constriction 13 in order to make it possible for the mixing-chamber wall and the wall of the chamber 8 to slide past one another.

The constriction 13 of the container 5 is arranged in the mount of the accommodating opening, as a result of which unintended opening of the container can be prevented. This can be seen in Figure 2. Two containers 5, 5' are retained in the basic body 11 of the retaining device 1.

Another example of the first embodiment is illustrated in Figure 3. The basic body 11 of the retaining device 1 has a curved-conical outer region of the accommodating opening 2, by way of which the containers 5, 5' are removed. Two standing feet 10 are integrated directly in the basic body 11 in the outer region of the accommodating opening 2. On the opposite side of the accommodating opening 2, the basic body, which consists of polyethylene, has two laterally arranged grip surfaces 9. On account of the dimensions of the basic body, the latter has a certain elasticity and facilitates the removal of the containers. The grip surfaces 9 are provided with linear elevations in order for it to be possible for the retaining device 1 to be held to better effect. The grip surfaces additionally contain two further standing feet 10. It is thus possible for the retaining device 1 to be safely set down once, for example, the first container has been removed, and the substance contained in this container is then removed. The length of the standing feet 10 is such that the containers 5, 5' do not come into contact with the unlying surface.

The retaining device 1 in Figure 4 has a different form of accommodating opening 2. Starting from a u-shaped portion posi-

tioned in the peripheral region, the accommodating opening 2 follows a curved course and has three mounts 4. This curved course allows text-carrying panels 12 to be produced on the basic body 11, it being possible to apply further information relating to the respectively adjacent container to these panels. It is thus possible for this information to be used to instruct the user as to the treatment sequence and, associated therewith, waiting times, exposure times, etc.

The retaining device 1 according to Figure 5, in this exemplary embodiment, has only two standing feet 10. These form, together with the container 5 which is to be removed last, the common standing surface of the retaining device 1. The grip surface 9 has an oval shape and latticework elevations for improving the grip reliability.

Figures 6a and 6b show a further example of the first embodiment. The accommodating opening 2 is of profiled design. For approximately 20% of the material thickness of the basic body 11, the width of the accommodating opening 2 is 3 mm and for the rest of the thickness, approximately 80%, the accommodating opening 2 widens to 4 mm. This width, however, is sufficient in order for it to be possible to fix the container 5 securely, since the diameter of the top container part is larger by 20%. The profiling begins in the outer region of the accommodating opening 2, in order to ensure a certain degree of guidance for the container 5 as it is pushed in and removed. The standing surface 10, which is integrated directly in the basic body 11, allows the retaining device 1 to be set down on an underlying surface. At the same time, the standing surface 10 prevents the containers from falling out in the case where the container is mistakenly forced out of the profiling. This purpose is preferably also served by the lateral elevations on that side of the

standing surface 10 which is directed towards the gap-form accommodating opening 2. The containers are prevented from falling out laterally. Grip surfaces 9 are arranged in the transition region between the standing surface 10 and the region of the basic body 11 which contains the accommodating opening 2.

In a second embodiment of the retaining device 1, the basic body 11 has a cylindrical shape (Figure 7a). However, only sub-regions of the circumferential wall of the basic body 11 are provided in full. The bottom, larger portion 3 can accommodate a container largely in full. In the top region of the retaining device 1, the basic body 11 has a mount 4 and a latching nose 15. The mount itself comprises a group element 16 and a predetermined breaking point 14. The latching nose 15, with a mount 4 unopened, fixes a container within the basic body 11. When the mount 4 is broken open at the predetermined breaking point 14, this creates the accommodating opening 2 of the retaining device 1, as is illustrated in Figure 7b. It is only possible to remove the container 5' first of all and then the container 5. The removal cannot take place in reverse order. For the purpose of introducing the containers 5 and 5', either the end surface of the bottom portion 3 of the basic body 11 may be of open configuration and subsequently closed with a disk of material or the latching nose 15 is only formed once the containers 5 and 5' have been introduced.

In a third embodiment, as Figures 8a and 8b show, the basic body 11 of the retaining device 1 is provided with two mounts 4. The accommodating opening 2 is arranged virtually in the immediate vicinity of the first mount 4. While the retaining device 1 is of very narrow configuration in plan view, the grip surface 9 can clearly be seen in the side view according to Figure 8b. This grip surface ensures that the retaining device is held se-

curely even during removal of the containers. The grip surface 9 here is configured without additional grooves or lattice work structures. It is nevertheless possible for the grip surface 9 to be designed in other, varying forms. As an alternative, the retaining device 1 may have its grip surfaces replaced by a plug-on opening 17 (Figure 3c). This plug-on opening 17 here is in the form of a breached annular portion. The breach is arranged in the outward direction, with the result that the user can easily fit the retaining device 1 onto a finger. The retaining device 1 is directly to hand, but the user is nevertheless free to work with both hands. The plug-on opening 17 may be produced cost-effectively together with the basic body 11 of the retaining device 1.

A further embodiment analogous to that which has been shown in Figures 6a and b is shown in a cross-sectional illustration in Figure 9a. The basic body 11 of the retaining device 1 has directly integrally formed grip surfaces 9. The mounts 4 have a top portion, which has a smaller opening diameter than the bottom portion, which is oriented in the direction of the grip surfaces 9. These openings of different sizes allow containers of different configurations to be accommodated in the retaining device 1. Figures 9b and c show a further advantage of this variant. In Figure 9b, the containers 5 and 5' in the retaining device 1 are still arranged in their original, unopened form in the basic body 11. Together with the grip surface 9, the containers 5, 5' allow the retaining device 1 to be placed in an upright position. As soon as the containers 5 and 5' have been removed from the retaining device 1 and opened, the retaining device 1 can be turned through 180° (Figure 9c). The basic body 11 then forms a bearing surface for the retaining device 1, with the result that the used containers 5 and 5' can be plugged back

again into the retaining device 1. The grip surface 9 still serves for gripping the retaining device 1.

Figure 10 shows a further aspect of a retaining device 1. Integrally formed alongside the mounts 4 in the basic body 11 are two accommodating means 18, which accommodate the containers once they have been used. The accommodating means 18 comprise in each case 2 elastic, finger-like protrusions which enclose the container in a form-fitting manner. In addition to the grip surface 9, the retaining device 1 has two standing feet 10, which allow the retaining device 1 to be set down. The standing feet 10 are provided in the immediate vicinity of the accommodating opening 2 and are advantageously produced with the basic body. It is thus possible for the containers to be stowed in an ordered manner again following use, and they can be disposed of together with the retaining device 1.

The examples of the retaining device which are shown are not, in principle, limited to just two or three mounts 4. The number of mounts may be adapted to the respective requirements, i.e. it is possible to provide retaining devices with 4, 5 or even more mounts.